

rose rapidly to 186° , and that the entire liquid, previously dissolved in the ether, distilled over between that temperature and 197° Cent. This was no doubt oxalate of propyle. On heating this body in a retort with solid caustic potash, I obtained a volatile distillate. This I then dried over chloride of calcium, and in order to secure its complete dehydration, treated it with a small piece of sodium. On re-distilling, I found that the entire liquid passed over between 83° and 88° Cent. The portion distilling between 85° and 88° gave on analysis results corresponding with the formula of propylic alcohol, as will be seen on inspecting the following table :—

	Theory.	Per cent.	Experiment.
C ₆	36	60.00	59.21
H ₈	8	13.33	13.47
O ₂	16	26.67	
	<hr/> 60	<hr/> 100.00	

By treating this body with iodine and phosphorus, I succeeded in regenerating iodide of propyle. This is a very ready method of preparing propylic alcohol when a large quantity is not required.

III. "On the Distillation of Mixtures: a Contribution to the Theory of Fractional Distillation." By J. A. WANKLYN, Esq. Communicated by Dr. FRANKLAND. Received April 17, 1863.

There are many points in the boiling of mixtures which are obscure. The tension of the vapours at the temperature whereat the mixture boils, and the proportions in which the constituents of the mixture are present, are not the only factors which determine the relative rates at which the constituents distil. There have, for instance, to be taken into account the adhesion of the liquids to one another, and the vapour-densities of these liquids. On the present occasion I have to call attention to the influence of this latter element, which influence seems to have been lost sight of by most of those who have applied themselves to this subject.

Leaving out of account for a moment the influence of adhesion, and simplifying the influence of the proportion in which the ingredients are present by taking equal weights of two liquids of different

boiling-points, we may set down the rates at which these ingredients will distil as determined by the tensions of the liquids and the densities of the vapours. In the first instant of time the quantity of each ingredient which distils will be found by multiplying its tension at the boiling-point of the mixture by its vapour-density. It thus appears that the liquid with the highest tension will not of necessity distil the quickest, for what the other liquids want in tension they may make up by the greater density of the vapours which they give off. And so when we mix a more volatile with a less volatile liquid and proceed to distil the mixture, we shall now and then find that the less volatile liquid distils faster than the more volatile one. I will here bring forward an experiment to illustrate this point.

	Vapour-density.
Methyl-alcohol boils at 66° C.	1·107
Iodide of ethyl boils at 72° C.	5·397

I took 18 grammes of methyl-alcohol and 17 grammes of iodide of ethyl, mixed them, and distilled off rather more than one-third of the mixture. The distillate consisted of

$$\begin{array}{r} 6\cdot0 \text{ grammes methyl-alcohol,} \\ 8\cdot7 \text{ grammes iodide of ethyl,} \\ \hline 14\cdot7 \end{array}$$

which shows that in this case the less volatile constituent had boiled the faster, the less volatile iodide of ethyl having a very much higher vapour-density than methyl-alcohol.

It will be obvious that when the vapour-densities and tensions are inversely proportional, the mixture must distil over unchanged. This influence of vapour-density goes a great way to explain why homologous bodies are so difficult of separation by means of fractional distillation. The more complex the formula the higher the boiling-point, but also the higher the vapour-density, and therefore the greater the value of the vapour. Why oils, &c. distil so readily in steam is also explained; for aqueous vapour is one of the lightest, while oily vapours are generally heavy.